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JUN 2 - 1965

CURRENT SERIAL RECORDS

**WATER SUPPLY OUTLOOK**  
and  
**FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS**  
**for**  
**MONTANA**

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,  
and  
MONTANA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the  
agencies named above in cooperation with Federal,  
State, and private organizations listed on the  
inside back cover of this report.

AS OF  
**MAY 1, 1965**

# UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

## To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Soil Conservation Service, 511 N.W. Broadway - Room 507, Portland, Oregon 97209.

## PUBLISHED BY SOIL CONSERVATION SERVICE

<u>REPORTS</u>	<u>ISSUED</u>	<u>LOCATION</u>	<u>COOPERATING WITH</u>
<b>RIVER BASINS</b>			
WESTERN UNITED STATES			
WESTERN UNITED STATES	MONTHLY (FEB.-MAY)	PORTLAND, OREGON	ALL COOPERATORS
BASIC DATA SUMMARY	OCTOBER 1	PORTLAND, OREGON	ALL COOPERATORS
<b>STATES</b>			
ALASKA	MONTHLY (MAR.-MAY)	PALMER, ALASKA	ALASKA S.C.D.
ARIZONA	SEMI-MONTHLY (JAN.15 - APR.1)	PHOENIX, ARIZONA	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO	MONTHLY (FEB.-MAY)	FORT COLLINS, COLORADO	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO	MONTHLY (JAN.-JUNE)	BOISE, IDAHO	IDAHO STATE RECLAMATION ENGINEER
MONTANA	MONTHLY (JAN.-JUNE)	BOZEMAN, MONTANA	MONT. AGR. EXP. STATION
NEVADA	MONTHLY (JAN.-MAY)	RENO, NEVADA	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES DIVISION OF WATER RESOURCES
OREGON	MONTHLY (JAN.-JUNE)	PORTLAND, OREGON	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH	MONTHLY (JAN.-JUNE)	SALT LAKE CITY, UTAH	UTAH STATE ENGINEER
WASHINGTON	MONTHLY (FEB.-JUNE)	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING	MONTHLY (FEB.-JUNE)	CASPER, WYOMING	WYOMING STATE ENGINEER

## PUBLISHED BY OTHER AGENCIES

<u>REPORTS</u>	<u>ISSUED</u>	<u>AGENCY</u>
BRITISH COLUMBIA	MONTHLY (FEB.-JUNE)	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA	MONTHLY (FEB.-MAY)	CALIF. DEPT. OF WATER RESOURCES, P.O. Box 388, SACRAMENTO, CALIF.

WATER SUPPLY OUTLOOK  
FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS  
for  
MONTANA

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MONTANA  
WATER SUPPLY OUTLOOK  
as of  
May 1, 1965

West of the divide, snow cover averages about the same as a year ago and is about 20 to 30 percent above average except on the Kootenai where it is near average. High elevation snow continues to increase or remain at about the same water content as a month ago. The snow is very dense and on many snow courses two inches of snow contains about one inch of water.

East of the divide, snow cover is 10 to 40 percent greater than a year ago and 40 to 80 percent above average on the Missouri and Yellowstone headwaters. The headwater area of the Marias and Sun Rivers along the Continental Divide has a snow pack that is about 10 percent above average and about the same as a year ago. Along the main stem of the Missouri River, from Toston to Fort Benton, tributary streams have a snow cover about 5 percent less than a year ago and about 40 percent above average. All high elevation snow courses continue to show a dense snow pack.

Runoff during April was a little above average on the Kootenai River, about 15 to 25 percent above average on Flathead River tributaries, and 35 to 65 percent above average on the Bitterroot, Upper Clark Fork and Blackfoot drainages. Runoff for the next five months is forecast to be near average on the Kootenai River and its tributaries in Montana, 15 to 25 percent above average on the Flathead River tributaries, and 25 to 30 percent above average on the Upper Clark Fork drainages.



East of the divide, runoff during April was near average from the higher elevation tributaries. Above average flows occurred on the Jefferson and Marias Rivers tributaries. The Milk River above Fresno Reservoir produced about two and one-half times its average runoff in April.

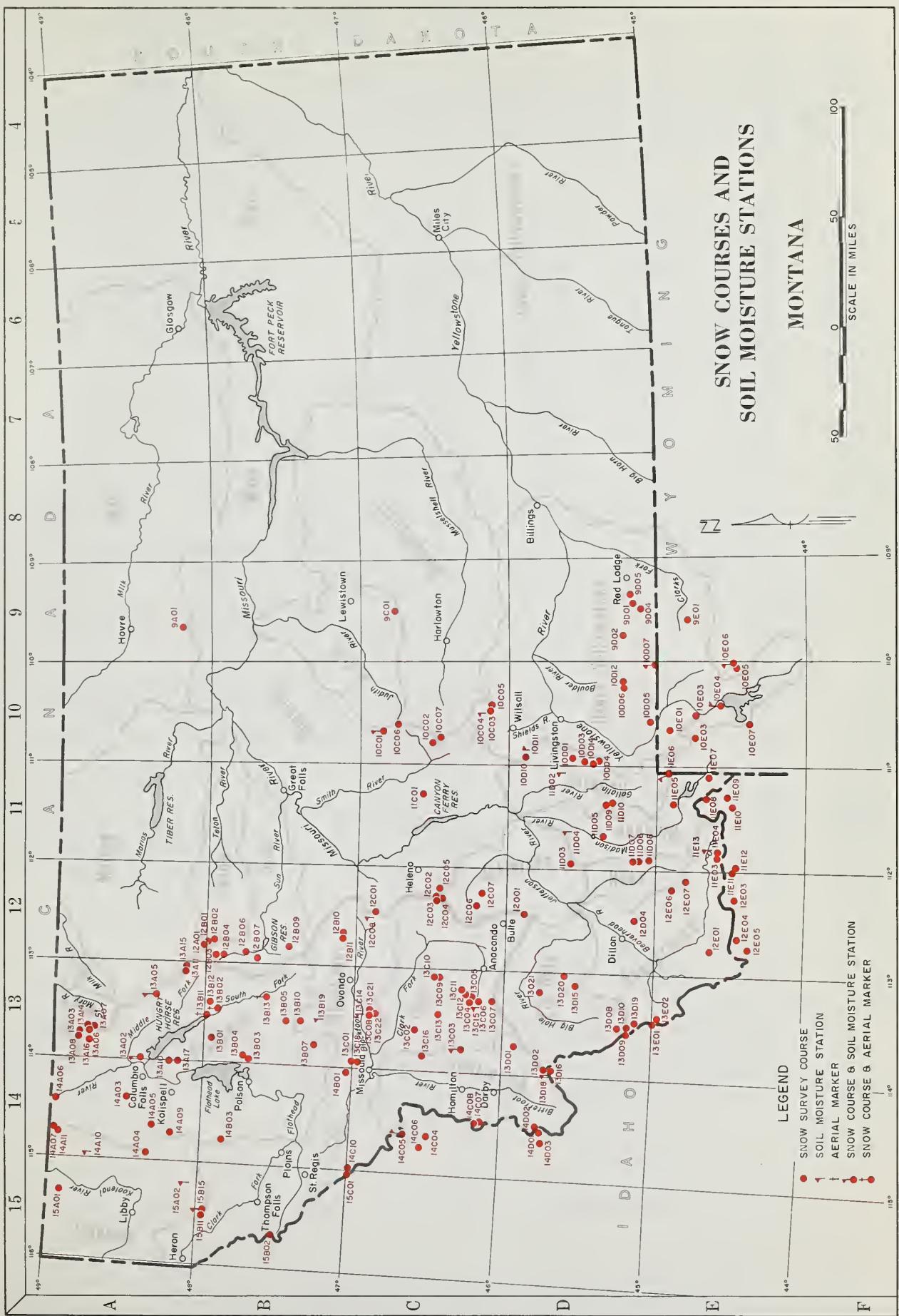
Runoff for the next five months is forecast to be 20 to 40 percent above average on headwaters of the Missouri River except runoff near 50 percent above average is expected on the Red Rock River. Tributaries to the Missouri River originating along the Continental Divide are forecast 15 to 20 percent above average. Streams originating in the Crazy, Belt, Castle and Snowy Mountains in central Montana are expected to produce 35 to 50 percent above average runoff. Below average runoff is forecast for the Milk River. However, reservoirs were filled during the April runoff and diversions from the St. Mary River should satisfy irrigation requirements. The Yellowstone River and its tributaries originating in the Absarokee and Beartooth Mountains are forecast 20 to 35 percent above average. Natural runoff from the Big Horn River in Wyoming is forecast about 40 percent above average, but reservoirs have been drawn down to control spring runoff and streamflow below reservoirs may not indicate the high runoff.

High water during spring runoff is not expected to cause much damage unless warm heavy rains occur during the main snow melt period. The heavy high elevation snow is not seen as a great flood threat. High elevation runoff can add to peak flows but is normally not a major factor. Usually, severe conditions are generated by heavy rains falling on the low and median elevation snow pack.

Soil moisture at low and median elevations is generally near or over field capacity as a result of recent snow melt. Higher elevation soils are not saturated as very little melt has occurred.

Reservoirs are generally being regulated to control spring runoff and help reduce peak flows.





## 1965 INDEX to MONTANA SNOW COURSES and SOIL MOISTURE STATIONS

## SNOW COURSES

Number	Elev. ft.	Secs.	Top. ft.	Raing. Bd.	Raing. Bd.	COLUMBIA RIVER BASIN
KOOTENAI RIVER						
1581A	5950	36	268	314	15	
1581B	5950	5	258	364	15	
1581C	5950	12	258	364	15	
14203	5950	1	265	254	15	
14211	4200	1	265	254	15	
15101	6000	4	265	244	15	
14407	5450	20	378	244	15	
FLATHEAD RIVER						
12803	5550	11	226	254	15	
12804	5550	31	288	184	15	
12805	6750	20	288	184	15	
13407	6400	37	288	184	15	
13005	5600	24	311	194	15	
13006	5500	82	228	184	15	
14095	5150	11	288	164	15	
14096	6300	35	268	164	15	
14097	5700	35	328	134	15	
13913	4250	18	210	134	15	
13914	4750	24	270	224	15	
13915	4850	34	228	224	15	
13406	5250	24	228	144	15	
13407	5250	40	258	174	15	
13807	6300	23	258	154	15	
13808	7000	11	288	174	15	
13809	6600	9	258	174	15	
13810	6100	1	258	174	15	
13811	5800	24	268	164	15	
13812	7000	28	208	154	15	
BLAKEY FORK RIVER,						
13613	7100	26	284	154	15	
13614	5700	1	154	94	15	
13211	6250	2	154	94	15	
13810	6250	12	188	164	15	
13609	7800	23	88	124	15	
13610	7800	12	68	124	15	
13611	7800	14	68	124	15	
13612	7800	16	144	277	15	
13603	5900	16	145	154	15	
13604	5900	6	154	154	15	
13620	5450	19	138	144	15	
13621	4850	23	138	154	15	
13622	4850	11	138	154	15	
13623	7700	21	68	174	15	
13624	7550	35	68	174	15	
13625	7100	25	144	164	15	
13626	7100	16	144	164	15	
13627	7100	8	154	164	15	
13628	6600	12	144	164	15	
13629	7780	19	144	164	15	
13630	7780	11	144	164	15	
13631	7780	6	144	164	15	
13632	7000	6	144	174	15	
13633	6600	33	154	194	15	
14201	6600	33	154	194	15	
BITTERROOT RIVER						
13201	6400	28	98	174	15	
13202	5400	16	214	174	15	
13203	7100	4	25	194	15	
14202	5900	19	45	234	15	
14203	5800	19	15	234	15	
14204	5800	25	144	244	15	
14205	5800	32	54	244	15	
13204	5600	1	258	174	15	
13205	5600	1	258	174	15	
13206	5600	1	258	174	15	
13207	4800	22	258	174	15	
13208	4800	27	258	164	15	
13209	6900	21	45	224	15	
13210	7000	21	45	224	15	
13211	7000	22	45	224	15	
13212	7000	21	45	224	15	
13213	7000	21	45	224	15	
13214	7000	21	45	224	15	
13215	7000	21	45	224	15	
13216	7000	21	45	224	15	
13217	7000	21	45	224	15	
13218	7000	21	45	224	15	
13219	7000	21	45	224	15	
13220	7000	21	45	224	15	
13221	7000	21	45	224	15	
13222	7000	21	45	224	15	
13223	7000	21	45	224	15	
13224	7000	21	45	224	15	
13225	7000	21	45	224	15	
13226	7000	21	45	224	15	
13227	7000	21	45	224	15	
13228	7000	21	45	224	15	
13229	7000	21	45	224	15	
13230	7000	21	45	224	15	
13231	7000	21	45	224	15	
13232	7000	21	45	224	15	
13233	7000	21	45	224	15	
13234	7000	21	45	224	15	
13235	7000	21	45	224	15	
13236	7000	21	45	224	15	
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13252	7000	21	45	224	15	
13253	7000	21	45	224	15	
13254	7000	21	45	224	15	
13255	7000	21	45	224	15	
13256	7000	21	45	224	15	
13257	7000	21	45	224	15	
13258	7000	21	45	224	15	
13259	7000	21	45	224	15	
13260	7000	21	45	224	15	
13261	7000	21	45	224	15	
13262	7000	21	45	224	15	
13263	7000	21	45	224	15	
13264	7000	21	45	224	15	
13265	7000	21	45	224	15	
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13267	7000	21	45	224	15	
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13279	7000	21	45	224	15	
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13281	7000	21	45	224	15	
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13300	7000	21	45	224	15	
13301	7000	21	45	224	15	
13302	7000	21	45	224	15	
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13328	7000	21	45	224	15	
13329	7000	21	45	224	15	
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13333	7000	21	45	224	15	
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13339	7000	21	45	224	15	
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13341	7000	21	45	224	15	
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13348	7000	21	45	224	15	
13349	7000	21	45	224	15	
13350	7000	21	45	224	15	
13351	7000	21	45	224	15	
13352	7000	21	45	224	15	
13353	7000	21	45	224	15	
13354	7000	21	45	224	15	
13355	7000	21	45	224	15	
13356						

## SOIL MOISTURE STATIONS

Drainage Basin & Course Name	Number	Elev.	Sec.	Top.	Range	Record Begun.
<b>COLUMBIA RIVER BASIN</b>						
KOOTENAI RIVER						
Bitterroot Trail	1510M	3800	5	24N	304	1964
Murphy Lake R. S.	1410M	3000	5	24N	254	1964
Raven R. S.	15402H	3050	2	26N	294	1964
FLATHEAD RIVER						
Barret Mountain	13402M	5400	24	31H	194	1956
Barret Mountain Pass	13405H	5250	34	30H	244	1950
CLARK FORK RIVER						
Georgeboom Lake	13015H	6450	6	5N	134	1962
Lubrecht Forest	13012M	4300	11	13N	154	1961
Sealy Lake	13095M	4030	21	17N	154	1963
Skalido Summit	13039M	7260	30	6N	174	1964
BITTERROOT RIVER						
Gibbons Pass	13018H	7100	4	25	194	1962
Lolo Pass	1405M	5250	11	10N	244	1963
<b>MISSOURI RIVER BASIN</b>						
BEAVERHEAD RIVER						
Lakeview	11112H	6700	23	14S	24	1962
MADISON RIVER						
Red Bluff	11104M	4800	7	35	15	1961
GALLATIN RIVER						
College Gste	11002M	4856	18	25	5E	1956
Tonny-Ona Mle	11044M	7150	1	11S	5E	1963
MISSOURI RIVER MAIN STEM						
Stampede Pass	12028M	6350	16	13N	74	1963
Kings Hill	10021M	7420	34	13N	8E	1963
YELLOWSTONE RIVER						
Battle Ridge	10011M	6020	32	2N	7E	1960
Northeast Entrance	10070H	7350	33	9S	12E	1962
Streets River	10022M	5850	4	4N	10E	1960

May 15 and June 1.

2/ Minerals refer to Agency that secures the snow survey as follows:

1. Soil Conservation Service
6. National Park Service

Montana Experimental Station

U. S. Geological Survey  
Minerals Division  
Washington, D. C.

14. Bureau of Sport Fisheries and Wildlife Service, U.S. Fish and Wildlife Service, Washington, D.C.

N = Soil moisture

# WATER SUPPLY FORECASTS

AS OF MAY 1, 1965

(1000 Acre Feet)

NO.	RIVER AND FORECAST POINT	FORECAST	FORECAST	PERCENT	MEASURED FLOW	
		PERIOD	THIS YEAR	AVERAGE	LAST YEAR*	AVERAGE
CLARK FORK RIVER						
3404	Milltown (above)(14)	May-Sept	900	131	917	686
		May-July	700	131	794	589
		May-June	643	131	661	490
3405	Missoula (above)	May-Sept	2,090	131	1,960	1,600
		May-July	1,835	131	1,736	1,405
		May-June	1,543	131	1,469	1,180
3530	Missoula (below)	May-Sept	3,855	129	3,615	2,984
		May-July	3,465	129	3,238	2,681
		May-June	2,933	130	2,690	2,263
3545	St. Regis (at)	May-Sept	5,060	125	4,717	4,036
		May-July	4,550	125	4,218	3,624
		May-June	3,840	125	3,510	3,066
3890	Plains (near)(18)	May-Sept	13,560	120	13,180	11,286
		May-July	12,320	120	11,892	10,230
		May-June	10,300	120	9,856	8,570
3920	Whitehorse Rapids (at)(19)	May-Sept	15,100	120	14,530	12,580
		May-July	13,650	120	13,064	11,369
		May-June	11,400	120	10,819	9,499
WEST FORK BITTERROOT RIVER						
3425	Conner (near)(15)	May-Sept	200	127	233	157
		May-July	186	127	216	146
BITTERROOT RIVER						
3440	Darby (near)	May-Sept	656	127	695	518
		May-July	608	127	673	478
		May-June	525	127	566	414
3528	Missoula (at)(16)	May-Sept	1,765	128	1,655	1,384
		May-July	1,630	128	1,502	1,277
		May-June	1,390	128	1,221	1,084
BLODGETT CREEK						
3475	Corvallis (near)	May-Sept	51.0	128		39.9
		May-July	48.5	128		37.9

(14) Difference in observed flow, Clark Fork above Missoula & Blackfoot near Bonner.

(15) Adjusted for storage in Painted Rocks Reservoir.

(16) Difference in observed flow, Clark Fork above and below Missoula.

(18) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.

(19) Adjusted for storage in Hungry Horse, Flathead Lake and Noxon Rapids Reservoirs.



# WATER SUPPLY FORECASTS

AS OF MAY 1, 1965

NO.	RIVER AND FORECAST POINT	FORECAST	FORECAST	PERCENT AVERAGE	(1000 Acre Feet)	
		PERIOD	THIS YEAR		LAST YEAR*	AVERAGE

## MISSOURI RIVER BASIN

	RED ROCK RIVER					
0110	Kennedy Ranch (at)	May-Sept	73.7	148	72.6	49.8
		May-July	65.7	148	65.8	44.3
0125	Monida (near)(1)	May-Sept	80.0	146	95.4	54.9
		May-July	73.2	146	92.8	50.2
	BIG HOLE RIVER					
0255	Melrose (near)	May-Sept	831	133	788	625
		May-July	770	133	724	576
	BOULDER RIVER					
0330	Boulder (near)	May-Sept	80.6	122	101	66.4
		May-July	77.0	122	96.5	63.2
	JEFFERSON RIVER					
0345	Sappington (at)	May-Sept	1,120	136	1,187	824
		May-July	985	136	1,066	725
	MADISON RIVER					
0375	West Yellowstone (near)	May-Sept	215	120	190	179
		May-July	155	120	140	129
0385	Grayling (near)(2)	May-Sept	447	123	426	364
		May-July	338	123	332	274
0410	McAllister (near)(3)	May-Sept	780	125	784	623
		May-July	600	125	626	481
	GALLATIN RIVER					
0435	Gateway (near)	May-Sept	536	128	527	418
		May-July	452	128	451	353
	BRIDGER CREEK					
0485	Bozeman (near)	May-Sept	21.5	130	21.8	16.5
		May-July	19.8	130	20.1	15.3
	HYALITE CREEK					
0500	Bozeman (near)(4)	May-Sept	43.5	133	43.0	32.6
		May-July	37.0	133	37.3	27.8
	GALLATIN RIVER					
0525	Logan (at)	May-Sept	567	142	568	400
		May-July	470	142	470	330

(1) Adjusted for storage in Lima Reservoir.

(2) Adjusted for storage in Hebgen Lake.

(3) Adjusted for storage in Hebgen and Ennis Lakes.

(4) Adjusted for storage in Middle Creek Reservoir.



# WATER SUPPLY FORECASTS

AS OF MAY 1, 1965

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	(1000 Acre Feet)	
					MEASURED FLOW LAST YEAR*	AVERAGE
<b>MISSOURI RIVER</b>						
0545	Toston (at)(3)	May-Sept	2,400	132	2,433	1,816
		May-July	2,020	132	2,102	1,530
0908	Fort Benton (at)(5)	May-Sept	3,740	130	4,520	2,861
		May-July	3,080	130	3,838	2,367
1095	Virgelle (at)(6)	May-Sept	4,500	127	5,684	3,557
		May-July	3,800	127	5,073	2,999
1150	Zortman (near)(6)	May-Sept	5,000	129	6,296	3,885
		May-July	4,180	129	5,566	3,254
1320	Fort Peck Dam (below)(7)	May-Sept	4,850	130	6,075	3,728
		May-July	4,150	130	5,547	3,200
1770	Wolf Point (near)(7)	May-Sept	5,060	128		3,942
		May-July	4,330	128		3,380
3300	Williston, N.D. (near)(8)	May-Sept	12,200	131	13,100	9,299
		May-July	10,600	131	11,953	8,068
<b>PRICKLY PEAR CREEK</b>						
0615	Clancy (near)	May-Sept	23.0	121	33.3	19.0
		May-July	19.7	121	28.4	16.2
<b>SUN RIVER</b>						
0786	Gibson Dam (at)(10)	May-Sept	700	122	721	573
		May-July	636	122	674	522
0920	TWO MEDICINE CREEK					
	Browning (near)(20)	May-Sept	290	120	293	241
		May-July	276	120	279	229
<b>BADGER CREEK</b>						
0925	Browning (near)	May-Sept	152	115	184	132
		May-July	129	115	166	112
<b>CUT BANK CREEK</b>						
0990	Cut Bank (at)	May-Sept	134	111	136	121
		May-July	112	111	125	101
<b>MARIAS RIVER</b>						
0995	Shelby (near)(9)	May-Sept	657	116	783	564
		May-July	616	116	746	530

- (3) Adjusted for storage in Hebgen and Ennis Lakes.
- (5) Adjusted for storage in Canyon Ferry Reservoir.
- (6) Adjusted for storage in Canyon Ferry and Tiber Reservoirs.
- (7) Adjusted for storage in Canyon Ferry, Tiber and Fort Peck Reservoirs.
- (8) Adjusted for storage in Canyon Ferry, Tiber, Fort Peck, Buffalo Bill and Boysen Reservoirs.
- (9) Adjusted for storage in Two Medicine, Four Horns, Lake Frances and Swift Reservoirs.
- (10) Adjusted for storage in Gibson Reservoir and diversions.
- (20) Adjusted for storage in Two Medicine Reservoir and diversions into Two Medicine Canal.



# WATER SUPPLY FORECASTS

AS OF MAY 1, 1965

NO.	RIVER AND FORECAST POINT	FORECAST PERIOD	FORECAST THIS YEAR	PERCENT AVERAGE	(1000 Acre Feet)	
					MEASURED FLOW	LAST YEAR*
SOUTH FORK MUSSELSHELL R.						
1185	Martinsdale (above)	May-Sept	58.0	136	56.4	42.8
		May-July	55.3	136	54.6	40.7
MILK RIVER						
1350	Eastern Crossing (at)	May-Sept	185	90	249	206
YELLOWSTONE RIVER						
1915	Corwin Springs (at)	May-Sept	2,180	122	2,063	1,792
		May-July	1,810	122	1,700	1,487
1925	Livingston (near)	May-Sept	2,470	122	2,308	2,019
		May-July	2,030	122	1,888	1,662
2145	Billings (at)	May-Sept	4,750	129	4,198	3,675
		May-July	4,040	129	3,612	3,124
3090	Miles City (at)(12)	May-Sept	7,000	132		5,307
		May-July	6,080	132		4,609
3295	Sidney (near)(12)	May-Sept	7,100	135		5,245
		May-July	6,250	135		4,625
SHIELDS RIVER						
1935	Clyde Park (at)	May-Sept	122	149	124	82.1
		May-July	112	149	112	75.3
BOULDER RIVER						
2000	Big Timber (at)	May-Sept	447	135	366	330
		May-July	417	135	343	309
STILLWATER RIVER						
2050	Absarokee (near)(11)	May-Sept	725	136	537	531
		May-July	605	136	470	444
CLARKS FORK RIVER						
2075	Chance (at)	May-Sept	673	120	587	560
		May-July	605	120	546	504
2085	Edgar (at)	May-Sept	707	122	621	578
		May-July	620	122	573	507
ROCK CREEK						
2095	Red Lodge (near)	May-Sept	130	129	94.4	101
		May-July	100	129	76.4	77.2

(11) Adjusted for storage in Mystic Lake.

(12) Adjusted for storage in Buffalo Bill and Boysen Reservoirs.



# SNOW SURVEY DATA

AS OF MAY 1, 1965

(inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	WATER CONTENT	LAST YEAR
						AVERAGE	

## COLUMBIA RIVER BASIN

### KOOTENAI RIVER

15B11	Baree Creek	5500	4/29	88	45.2	58.8	49.1
15B15	Baree Trail	3800	4/29	0	0.0	-	-
14A04	Brush Creek	5000	4/28	26	10.2	12.4	10.7*
BC 10	Fernie	3500	4/29	7	3.1	3.8	2.8
BC 12A	Field	4200	4/30	0	0.0	0.0	0.6*
BC 11	Glacier	4100	4/30	45	22.6	27.8	25.9
14A11	Graves Creek	4300	4/30	40	16.9	-	-
BC 43	Gray Creek	5100	4/27	53	21.9	23.0	20.2
BC 33	Kicking Horse	5400	4/30	38	14.6	12.1	12.2
BC 20B	Kimberley	3800	4/30	0	0.0	0.3	1.2*
BC 32	Marble Canyon	5000	4/29	31	11.2	10.2	13.4
BC 10B	Morrissey Ridge	6100	4/30	68	28.0	-	-
BC 10A	New Fernie	4100	4/29	19	9.3	11.2	6.0*
15A01	Red Mountain	6000	4/29	52	21.9	16.6	20.9
BC 8A	Sinclair Pass	4500	4/29	0	0.0	1.7	2.2*
BC 20A	Sullivan Mine	5100	4/30	25	11.0	11.5	12.5
BC 41	Upper Elk River	4400	4/26	8	3.0	3.2	2.5*
14A07	Weasel Divide	5450	4/30	80	38.2	37.8	35.7*

### FLATHEAD RIVER

14B03	Bassoo Peak	5150	4/27	19	7.4	8.9	9.7*
13A11	Beaver Lake	5900	5/3	68	32.1	30.9	-
13B03	Big Creek	6750	4/29	119	59.8	51.6	50.5*
13A17	Camp Misery	6400	4/28	138	65.8	57.0	-
13A02	Desert Mountain	5600	4/27	43	20.6	16.5	14.6
13B04	Fatty Creek	5500	4/29	56	26.1	28.0	-
14A09	Griffin Creek Divide	5150	4/28	18	7.5	9.6	9.8*
13B12	Gunsight Lake	6300	5/3	111	50.4	50.9	-
14A03	Hell Roaring Divide	5770	4/30	77	37.5	38.8	31.5
13B13	Holbrook	4530	5/3	0	0.0	5.0	1.4*
14A05	Logan Creek	4300	4/28	4	1.6	4.4	3.4*
13A05	Marias Pass	5250	4/27	65	28.0	16.6	18.0
13A16	Mineral Creek	4000	5/1	39	16.7	21.0	-
13B07	North Fork Jocko	6330	4/30	112	55.0	58.1	48.0*
13B02	Spotted Bear Mountain	7000	5/3	31	14.6	16.5	12.4*
13A10	Strawberry Lake	5600	5/3	103	53.4	53.6	42.5*
13B01	Trinkus Lake	6100	5/3	104	54.4	55.2	45.4*
13B11	Twin Creeks	3580	5/3	0	0.0	9.8	1.4*
13B05	Upper Holland Lake	7000	5/3	90	45.5	46.8	39.0*



# SNOW SURVEY DATA

AS OF MAY 1, 1965

(Inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	WATER CONTENT LAST YEAR	AVERAGE

## CLARK FORK RIVER

13C13	Black Pine	7100	4/27	48	20.2	17.8	11.8*
12B10	Copper Creek	5700	4/26	35	15.6	14.6	-
12B11	Cotter Mine	6250	4/26	53	22.8	18.5	-
13B10	Coyote Hill	4200	4/30	11	5.0	5.2	2.3
13C11	Fred Burr Pass	8000	4/29	91	41.3	30.6	32.5*
14C10	Heart Lake Trail	4800	4/29	38	16.6	-	-
15C01	Hoodoo Creek	6200	4/29	114	56.6	55.2	50.2*
13C04	Intergaard	6450	4/29	24	8.4	9.0	-
15B02	Lookout	5250	4/27	82	36.6	44.3	36.4
13C21	Lubrecht Forest No. 3	5450	5/2	10	3.4	7.9	3.6*
13C22	Lubrecht Forest No. 4	4650	5/2	0	0.0	1.2	0.6*
13C08	Lubrecht Forest No. 6	4040	5/2	0	0.0	0.0	0.1*
13C12	Red Lion	7100	4/29	61	26.2	18.2	19.6*
13C03	Skalkaho Summit	7260	4/27	82	38.4	29.0	26.7*
13C02	Slide Rock Mountain	7100	4/28	50	22.3	21.8	14.7*
13C18	Spring Gulch	6000	5/2	7	3.0	11.0	3.1*
13C07	Storm Lake	7780	4/29	49	20.8	16.8	17.0*
13C01	Stuart Mountain	7400	5/2	86	38.4	36.2	30.4*
14B01	TV Mountain	6800	5/1	53	23.2	22.6	20.3*

## BITTERROOT RIVER

13C16	Ambrose	6480	4/28	38	15.4	16.5	11.0*
13D02	Gibbons Pass	7100	4/30	61	29.2	26.7	23.1
14C05	Lolo Pass	5230	4/27	74	34.8	40.8	31.8*
14C07	Lost Horse	5940	4/27	82	37.3	43.6	34.1*
14D02	Nez Perce Camp	5580	4/26	36	15.7	20.0	9.7
14D01	Nez Perce Pass	6570	4/26	45	19.8	22.6	13.3
13D22	Saddle Mountain	7940	4/30	71	33.3	-	-
14C08	Twin Lakes	6510	4/27	108	52.2	54.9	46.6*



# SNOW SURVEY DATA

AS OF MAY 1, 1965

(inches)

SNOW COURSE			CURRENT DATA			PAST RECORD	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	WATER CONTENT	AVERAGE

## MISSOURI RIVER BASIN

### BEAVERHEAD RIVER

13B10	Bloody Dick	7600	4/28	37	15.2	12.3	-
12D04	Carter Creek	7400				-	-
13E22	Dad Creek Lake	8400	5/4	57	23.2	-	-
13D15	Elk Horn Springs	7800	4/29	38	15.1	9.6	8.4*
13D09	Gold Stone	8100	4/28	56	22.7	16.8	-
11E04	Lakeview Canyon	6930	4/29	44	19.2	12.1	9.5*
11E03	Lakeview Ridge	7400	4/29	38	16.7	10.1	7.3*
12E01	White Pine Ridge	8850	4/27	23	7.9	8.1	-

### RUBY RIVER

11D08	Clover Meadow	8600	4/27	60	24.0	19.8	-
12E07	Divide	7900	4/27	38	14.7	12.0	-
12E06	Notch	8500	4/27	58	21.2	16.9	-

### BIG HOLE RIVER

13D20	Abundance Lake	8800	4/27	77	32.2	21.4	-
13D19	Darkhorse Lake	8600	4/27	97	41.0	27.7	-
13D21	Foolhen	8280	4/27	67	27.3	18.8	-
13D08	Jahnke Creek	7340	4/28	24	10.0	8.6	-

### JEFFERSON RIVER

12C07	Berry Meadow	7300	4/29	24	9.1	9.4	-
12D01	Pipestone Pass	7200	4/30	14	4.9	6.7	4.4*

### MADISON RIVER

11E09	Big Springs	6500	4/29	42	21.0	18.7	-
11D07	Call Road	8050	4/27	45	15.9	14.2	-
11D06	Crockett Lake	8400	4/27	44	15.5	13.3	-
11D12	Four Mile	6900	4/27	28	10.6	-	-
11E05	Hebgen Dam	6550	4/27	24	10.8	10.3	4.8
11E10	Island Park	6315	4/29	27	11.9	10.1	-
11D11	Lower Twin	7900	4/27	76	31.2	-	-
10E02	Norris Basin	7500	5/3	24	10.1	13.2	5.5*
11E21	Potomageton Park	7150	4/30	34	17.4	-	-
11E20	Sentinel Creek	8300	4/30	79	37.2	-	-
11E08	Valley View	6500	4/29	39	18.6	16.1	-
11E07	West Yellowstone	6700	4/28	27	11.5	8.3	5.6



# SNOW SURVEY DATA

AS OF MAY 1, 1965

SNOW COURSE			CURRENT DATA			PAST RECORD (inches)	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	WATER CONTENT	AVERAGE

## GALLATIN RIVER

10D14	Arch Falls	7350	5/1	44	16.8	15.5	-
11D09	Bear Basin	8150	4/30	64	27.9	25.2	-
10D15	Bridger Bowl	7250	4/29	77	35.2	-	-
10D04	Devil's Slide	8100	5/1	77	32.0	27.0	24.9
10D03	Hood Meadow	6600	5/1	27	10.0	12.1	6.6
11D10	Little Park	7400	4/30	50	19.0	19.4	-
11E06	Twenty-One Mile	7150	4/28	55	24.9	18.6	14.9

## MISSOURI RIVER (Main Stem)

11C01	Boulder Mountain	7950	4/27	64	23.4	-	-
12C05	Chessman Reservoir	6200	4/28	8	2.2	7.4	2.9
10C07	Elk Peak	8000	4/28	67	26.8	21.2	-
10C02	Grasshopper	7000	4/28	21	7.4	8.6	-
10C01	Kings Hill	7500	4/28	52	18.4	18.8	13.8
12C01	Stemple Pass	6600	4/27	43	14.2	14.2	9.8
12C02	Ten Mile Lower	6600	4/28	20	6.8	9.1	4.1
12C03	Ten Mile Middle	6800	4/28	41	15.0	14.5	9.9
12C04	Ten Mile Upper	8000	4/28	53	21.0	19.0	14.2

## SUN-TETON-MARIAS RIVERS

13A15	Badger Pass	6900	5/3	106	50.0	46.4	-
12B06	Cabin Creek	5200	5/3	0	0.0	0.0	-
12B09	Five Bull	5700	4/27	24	9.0	6.6	-
12A01	Freight Creek	6000	4/26	52	23.6	19.6	-
12B07	Goat Mountain	7000	4/30	42	16.0	12.6	10.3*
12B01	West Fork	6000	4/26	52	23.2	18.3	-
12B04	Wrong Creek	5700	5/3	28	14.1	17.4	-
12B03	Wrong Ridge	6800	5/3	59	30.9	25.6	-

## JUDITH RIVER

10C06	Spur Park	8000	4/29	74	29.7	27.2	-
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# SNOW SURVEY DATA

AS OF MAY 1, 1965

SNOW COURSE			CURRENT DATA			PAST RECORD (inches)	
NO.	NAME	ELEVATION	DATE OF SURVEY	SNOW DEPTH	WATER CONTENT	WATER CONTENT	
						LAST YEAR	AVERAGE

## SASKATCHEWAN RIVER

13A03	Iceberg Lake No. 3	5600	5/4	69	34.8	39.4	29.6
13A14	Josephine Lower No. 9	4900	5/3	46	19.6	19.3	17.9*
13A07	Mount Allen No. 7	5700	5/3	96	45.6	50.8	49.2
13A06	Piegan Pass No. 6	5500	5/3	86	43.3	45.2	41.3
13A08	Ptarmigan No. 8	5800	5/4	92	46.8	46.6	40.3

## UPPER YELLOWSTONE RIVER

10C05	Bald Ridge	7500	4/28	46	18.0	-	-
9D01	Camp Senia	7890	5/3	33	10.8	15.0	9.3*
10E03	Canyon	7750	4/30	53	24.7	16.0	13.5*
10E06	East Entrance	7000	5/2	11	2.7	4.7	3.6*
9D05	Grizzly Peak	8400	4/29	68	23.8	24.8	-
10D06	Independence	8000	4/26	64	27.0	18.8	17.7*
10E04	Lake Camp	7850	4/29	36	13.4	7.0	7.2*
9E01	Lodgepole	8200	4/29	38	12.1	11.3	10.7*
10E01	Lupine Creek	7300	5/3	24	8.2	8.2	7.4*
10D12	Monument Peak	9000	4/26	94	37.3	29.6	26.4*
10D07	Northeast Entrance	7400	5/1	24	10.2	8.2	6.2
10C03	Porcupine R. S.	6500	4/28	33	11.5	-	-
10D10	Sacajawea	6550	4/29	40	17.2	17.0	10.8*
10C08	South Fork Shields	8100	4/28	86	36.4	-	-
10E05	Sylvan Pass	7100	5/1	40	15.2	11.1	10.6*
9D04	Timberline Creek	8850	5/3	65	25.2	23.8	16.7*



# SOIL MOISTURE DATA

AS OF MAY 1, 1965

(Inches)

SOIL MOISTURE STATION			SOIL PROFILE		CURRENT DATA		PAST RECORD	
NO.	NAME	ELEVATION	DEPTH	FIELD CAPACITY	DATE OF SURVEY	SOIL MOISTURE	LAST YEAR	**AVERAGE

## COLUMBIA RIVER BASIN

### Kootenai

15B15M	Baree Trail	3800	48	7.5	4/20	6.7	-	-
14A10M	Murphy Lake R. S.	3000	48	22.6	5/3	23.0	-	-
15A02M	Raven R. S.	3050	48	23.0	4/29	22.0	-	-

### Flathead

13A02M	Desert Mountain	5600	54	8.4	4/27	9.6	6.8	8.2
13A05M	Marias Pass	5250	54	6.5	4/30	6.4	5.4	6.0

### Clark Fork

13C15M	Georgetown Lake	6450	48	9.0*	4/29	5.1	4.5	-
13B19M	Seeley Lake	4030	48	11.9*	5/3	12.0	11.9	-
13C02M	Skalkaho Summit	7260	48	10.8	4/27	9.7	-	-

### Bitterroot

13D18M	Gibbons Pass	7100	48	7.1	4/30	7.9	6.1	-
14C05M	Lolo Pass	5250	48	10.6*	4/27	9.4	5.5	-

## MISSOURI RIVER BASIN

### Beaverhead

11E13M	Lakeview	6700	48	15.3	5/5	16.5	14.8	-
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### Madison

10D04M	Red Bluff	4800	40	4.7	4/30	2.6	3.5	-
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### Gallatin

11D02M	College Site	4856	54	14.5	4/30	13.2	12.5	12.1
11E06M	Twenty-One Mile	7150	48	8.8	4/28	3.6	3.6	-

### Missouri Main Stem

10C01M	Kings Hill	7420	48	11.8	4/29	7.8	8.2	-
12C08M	Stemple Pass	6350	48	5.9	4/29	5.3	5.6	-

### Yellowstone

10D11M	Battle Ridge	6020	48	17.6*	4/29	16.6	14.3	-
10D07M	Northeast Entrance	7350	48	9.4	4/30	7.4	8.2	-



# RESERVOIR STORAGE DATA

AS OF APRIL 30, 1965

(1000 Acre Feet)

BASIN	RESERVOIR	USEABLE CAPACITY	USEABLE STORAGE		
			THIS YEAR	LAST YEAR	AVERAGE

## COLUMBIA RIVER BASIN

Flathead	Hungry Horse	3,428.0	1,564.0	2,003.0	2,097.0**
	Flathead Lake	1,791.0	1,132.0	770.7	968.0
	Camas 1/	45.2	29.7	22.3	38.1
	Mission Valley 2/	100.3	51.0	26.5	45.1
Clark Fork	Georgetown Lake	31.0	22.0	25.5	21.2
	Noxon Rapids	334.6		101.1	-
Bitterroot	Como	34.9	24.5	8.1	17.9
	Painted Rocks	31.7		25.4	22.0**

## MISSOURI RIVER BASIN

Beaverhead	Clark Canyon	225.6	108.5	-	-
	Lima	84.0	77.3	28.8	50.0**
Ruby	Ruby	38.8	-	-	31.7**
Madison	Hebgen Lake	384.8	198.8	224.6	174.8
	Ennis Lake	41.0	25.0	38.6	34.9
Gallatin	Middle Creek	8.0	4.1	5.0	4.6**
Missouri	Canyon Ferry	2,043.0	1,589.0	1,741.0	1,577.4**
	Hauser & Helena	61.9	58.4	63.0	50.1
	Lake Helena	10.4	9.2	10.9	6.6
	Holter Lake	81.9	69.0	66.2	61.8
	Smith River	10.7	11.4	9.0	8.3**
	Ackley Lake	5.8		2.8	3.9
	Durand	7.0	7.0	5.6	5.9
	Martinsdale	23.1	10.6	8.1	10.6
	Deadman's Basin	72.2	59.2	59.2	45.1**
	Fort Peck	19,410.0	15,950.0	11,920.0	11,128.6
Sun	Gibson	105.0	58.8	22.1	65.7
	Willow Creek	32.3	19.5	21.5	22.5
	Pishkun	32.0	21.1	17.0	23.5
Marias	Lower Two Medicine	16.6		2.2	0.8
	Four Horns	19.2		13.4	10.8
	Swift	30.0		14.1	26.7
	Lake Frances	112.0		37.2	95.8
	Tiber	1,313.0	815.5	632.9	656.3**
Milk	Fresno	127.2	134.9	58.4	108.1
	Nelson	66.8	40.3	26.9	39.8
	Lake Sherburne	66.1	28.7	-	24.8
Yellowstone	Mystic Lake	20.8	1.6	3.5	2.8
	Tongue River	68.0		40.5	20.4
	Cooney	27.5	11.2	23.0	15.0**

1/ Sum of four small reservoirs on west side of Flathead Lake.

2/ Sum of eight small reservoirs in Mission Valley not including Jocko Lake.



## Agencies Cooperating in Collecting Data Contained in this Bulletin

U. S. Forest Service  
Region 1, Missoula, Montana

U. S. Geological Survey  
Helena, Montana

U. S. Army Corps of Engineers  
Portland, Oregon  
Seattle, Washington  
Omaha, Nebraska

U. S. Indian Irrigation Service  
St. Ignatius, Montana

U. S. Weather Bureau  
Helena, Montana

U. S. Bureau of Sports Fisheries  
and Wildlife  
Red Rock Lakes Refuge  
Monida, Montana

U. S. Bureau of Reclamation  
Billings, Montana  
Boise, Idaho

Montana Power Company  
Butte, Montana

Agricultural Experiment Station  
North Montana Branch Station  
Havre, Montana

State Water Conservation Board  
Helena, Montana

National Park Service  
Yellowstone National Park  
Glacier National Park

Montana Experiment Station  
Montana State College  
Bozeman, Montana

Bonneville Power Administration  
Portland, Oregon

Montana State University  
School of Forestry  
Missoula, Montana

Soil Conservation Service  
Montana, Wyoming, Idaho

Soil and Water Conservation Districts  
Montana Counties

Johnson Flying Service, Inc.  
Missoula, Montana

Water Rights Branch, Dept.  
of Lands and Forests  
Victoria, British Columbia

Department of Northern Affairs  
and National Resources  
Calgary, Alberta

State Engineer  
Helena, Montana



# Montana's SNOW HARVEST

SCENIC SNOW-FED ROCK CREEK, SOUTH OF  
RED LODGE, NOTED FOR BOTH IRRIGATION  
AND FISHING.

11-306



*The Story of*  
**COOPERATIVE**  
**FEDERAL - STATE - PRIVATE**  
**SNOW SURVEYS AND**  
**WATER SUPPLY FORECASTS**

INTO MOUNTAIN SNOW  
PACK AREAS SURVEY-  
ORS TRAVEL BY RADIO  
EQUIPPED OVERSNOW  
VEHICLES

11-9443-4

---OR AFOOT ON  
SNOWSHOES OR  
SKIS.



FEDERAL-STATE  
COOPERATIVE  
SNOW SURVEYS  
**SNOW COURSE  
MARKER**  
SOIL CONSERVATION  
SERVICE  
USDA

11-9357-3

MAPPED SNOW COURSES  
THEY SEEK AND MEASURE  
ARE MARKED BY YELLOW  
SIGNS.

SSS-02

SNOW SURVEYORS CHECKING SNOW DEPTH AND  
TAKING SAMPLE. SCALE ON SKI POLE WILL WEIGH  
WATER CONTENT OF SNOW.

SS4-11



SNOW COURSE  
MARKER

## SNOW SURVEYS

Montana's annual snow harvest is worth much -- even in terms of money. Considered by many a hindrance to travel, a menace to man and animal or a delightful medium for fun -- such as skiing -- snow is actually a major factor in Montana's economy.

Most water in the West has its beginning as a snowflake falling gently on a timbered watershed. It matures into a droplet and with other droplets may be used to generate electricity, irrigate crops, quench thirst, drive industry, provide habitat for fish, produce lumber or become part of a wilderness lake.

The supply of water varies year to year, depending on how much snow accumulates in higher elevations -- how great the winter snowpack becomes.

Each winter month, pairs of snow surveyors travel deep into mountain snowpack areas to measure snow accumulation at locations called "snow courses." With specially built aluminum tubes, they measure snow depth and remove a core of snow which is weighed to determine how much water it contains. Each such snow course usually has 10 sampling stations. Snow depth and snow water equivalent (water content) are averaged and this is reported as the measurement for the course.

The U.S. Department of Agriculture Soil Conservation Service has the responsibility for coordinating snow



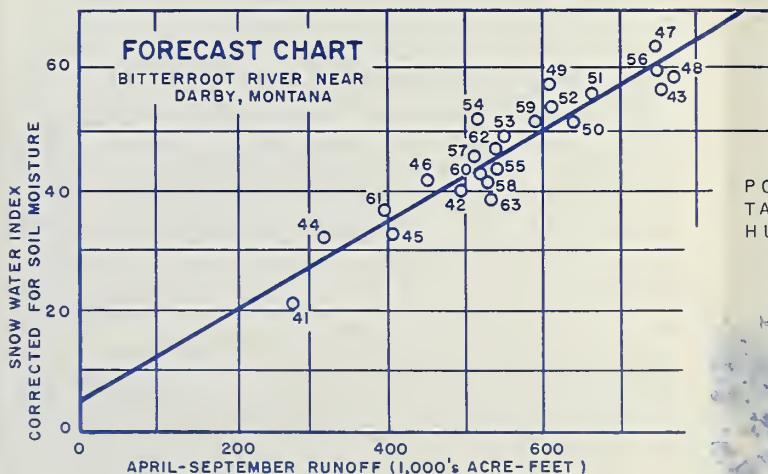
GOOD SOIL AND WATER MANAGEMENT BASED ON RELIABLE FORECASTS ARE EXEMPLIFIED BY THIS SUN RIVER FARM. 11-3066-4

SNOW SURVEY - BASED WATER FORECASTS AID PLANNING AND OPERATION OF RESERVOIRS SUCH AS THIS ON LOWER WILLOW CREEK. 11-7801-4



surveys in Montana. Assisting, either through funds or services are the Montana Agricultural Experiment Station, U.S. Forest Service, U.S. Geological Survey, U.S. Indian Irrigation Service, U.S. Bureau of Sport Fisheries and Wildlife, U.S. National Park Service, Montana Power Company, State Water Conservation Board, Montana State University School of Forestry and other private and public organizations.

POWER FROM A MIGHTY RIVER IS MORE PREDICTABLE AND MANAGEABLE THROUGH SNOW SURVEYS. HUNGRY HORSE DAM, FLATHEAD RIVER.



## STREAMFLOW FORECASTS

Snow survey data are used to forecast streamflow -- 70 to 80 per cent of the spring and summer runoff via mountain streams comes from snow melt. By consulting previous snow survey and streamflow records, trained personnel can make reliable estimates of a coming runoff as much as six months in advance. Measurements of soil moisture under the snowpack and subsequent precipitation add to accuracy of these predictions. Generally a forecast equation is developed by statistical methods for analyzing various types of data.

*This information along with snow survey, soil moisture and reservoir storage data is published in water supply outlook reports and bulletins and mailed to water users and others interested in water supply.*

Reports covering the entire state of Montana are published near the first of each month, January through June. Watershed reports covering smaller areas are published March 1, April 1 and May 1.

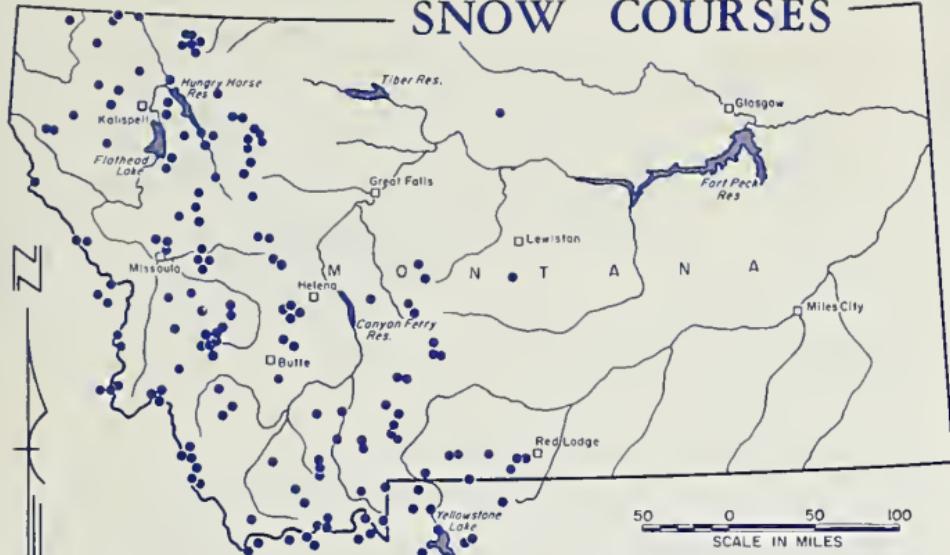
*Reliable forecasts of spring and summer runoff help many Montanans directly and almost everyone indirectly. Reservoirs, whether for irrigation, power, flood control or multipurpose, operated on the basis of water supply forecasts, can bring about maximum use of both stored and runoff water volumes. Farmers can determine, beforehand, which crop plantings are most suitable for the water supply available. Transportation companies can anticipate production from irrigated lands -- and hence the transportation requirements. Others, including agricultural loan firms and agencies, municipal water supply agencies and power generating companies or districts can plan operations to fit the expected supply of water.*

Of all natural resources in Montana, water is one of the most valuable -- and the snowpack is major source of that water. Snow surveys provide invaluable advance information on each year's potential supply.

---

*Current information on snow survey and water supply forecasting is available from the Snow Survey Supervisor, Box 855, Bozeman, Montana.*

# SNOW COURSES



MONTANA'S 125 SNOW COURSES AND 20  
SOIL MOISTURE STATIONS PROVIDE DATA  
FOR STREAMFLOW FORECASTS.

11-799



U.S.  
Department of Agriculture  
SOIL CONSERVATION  
SERVICE

33 E. Mendenhall  
BOZEMAN, MONTANA



CONSERVATION OF WATER  
BEGINS WITH THE  
SNOW SURVEY

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necessary for forecasting  
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domestic and municipal water  
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mining and industry

*"The Conservation of Water begins  
with the Snow Survey"*

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